WORLD HEALTH ORGANIZATION

Regional Office for the Eastern Mediterranean

SEMINAR ON SMALLPOX ERADICATION
Dacca, 29 October - 5 November 1969

EM/SEM.SE/22
ENGLISH ONLY

SMALLPOX VACCINATION THROUGH MOBILE TEAMS

by

Dr. Don Millar*
WHO Temporary Adviser

---

* Director, Smallpox Eradication Program, National Communicable Disease Center, Atlanta, Georgia, USA

INTRODUCTION

The two primary sources of new smallpox susceptibles are (a) newborns and (b) individuals losing residual immunity following smallpox vaccination. The former is by far the most numerically significant.

Maintenance vaccination activities attempt specifically to assure high vaccination coverage among susceptibles entering the population by birth. Prevention of the loss of residual immunity should be considered in planning maintenance programs, but has in practice proven to be of limited significance in comparison with the vaccination of newborns. Furthermore, the maintenance of high levels of immunity in the total population implies generally a mass vaccination program aimed at the total population rather than selective vaccination designed to protect the incoming new susceptibles (newborns).

It is desirable that each child entering the population by birth be vaccinated as soon as possible; the limited health resources in many smallpox-endemic and non-endemic countries make it impossible to develop services aimed at individual newborn care. Furthermore, the absence of fixed medical centers in many areas makes it mandatory to take vaccination directly to the people at intervals. The most practicable way of doing this is by mobile vaccination teams.

Why mobile maintenance smallpox vaccination activities? (1) Mobile vaccination campaigns, even in vast sparsely populated areas without roads and communications, can achieve near universal vaccination coverage (90 percent or better) with limited health resources. (2) An area covered by a mobile campaign in a short period of time is amenable to rapid concurrent assessment providing a quick evaluation. (3) A mobile campaign provides for geographic contiguity assuring high levels of immunity over broad geographic units. (4) In many countries, there is no other way to provide vaccination services.

THE STRATEGY OF MOBILE MAINTENANCE VACCINATION ACTIVITIES

1. The Target Group

Mobile maintenance activities are aimed at the major source of new susceptibles, children entering the population by birth since the last vaccination campaign. In many African countries, where measles and smallpox immunizations are done simultaneously, the "target group" is children aged six months to the number of months since the last vaccination campaign.

In campaigns designed to eliminate susceptibles accruing via loss of immunity, the target group is the total population.

2. The Frequency of Cycling

As it is desirable to vaccinate each child as soon as possible, it is logical that maintenance vaccination cycles as frequently as possible are desired. However, it appears that in most situations small numbers of susceptibles can exist in the population without undue danger. In the Ivory Coast, maintenance vaccination cycles occurring at three yearly intervals have been adequate to maintain the interruption of smallpox transmission over several years. Recent epidemiological history in the five countries of francophone Central Africa, suggest a two-year frequency is adequate. In countries having a birth rate of approximately 50 per 1,000, a three-year accumulation of susceptibles will amount to approximately 15-20 percent of the population. This is probably barely sufficient to support smallpox transmission in most situations.

As a rule of thumb, mobile maintenance vaccination activities are probably best carried out on an annual basis. This will have to be adjusted depending on the density of the population, migration habits, etc.

The frequency of total population revaccination depends upon several factors: (a) the progress of the WHO global smallpox eradication program, (b) the extent of nomadism (and thus rate of population "turnover") in the area, (c) the effectiveness of the intervening maintenance cycle in reaching newborns. The basic

immunologic fact is that substantial residual immunity to smallpox persists relatively long, at least 5-10 years. While WHO standards suggest a three-year interval for purposes of international travel, it is well known that this interval is conservative.

3. Method of Delivery

Vaccinations may be conducted on a house-to-house, or collecting point basis. In either, smallpox vaccine may be administered alone, or in combination with other immunizing agents, or other medical procedures.

IMPLEMENTATION OF MAINTENANCE OPERATIONS

Smith and others[1] ascribe four "critical factors" to the successful execution of mobile collecting point vaccination activities. These are as applicable to other mobile techniques as to the collecting point method: "(1) Good advance publicity, (2) well organized teams and team schedules, (3) well motivated teams, (4) cooperation of individuals being vaccinated."

A substantial amount of careful planning, preparation, and propaganda are prerequisite to the success of mobile vaccination activities. This is particularly true of maintenance vaccinations where the glamor and excitement of the initial campaign have "worn thin" and where hierarchical leaders and the people themselves must know the necessity for repetitive cycles.

The selection of immunization sites must be tailored specifically to the individual country or area. In Nigeria, urban vaccination sites were distributed such that each site served approximately 8,000 people, while in the rural areas of Northern Nigeria, large collecting points located 10 miles apart were utilized. Assessment showed good success with both, despite their obvious contrasting differences.

The same attention must be given to coordination, good personnel practices, team training and retraining, logistics and supply, recording, and team accountability for equipment and vaccines, as characterized the anti-dating mass campaign activities.

ASSESSMENT OF MOBILE MAINTENANCE VACCINATIONS

Assessment is even more critical in monitoring maintenance vaccination than in "attack phase" vaccination. Because of a more selective target group, there is greater room for discrepancy between tally data and existing population estimates; there is a general tendency to "over vaccinate", swelling the figures, and giving one a false sense of security. Similarly, in many endemic areas, birth registration does not exist, and census figures are unreliable. Concurrent coverage assessment is the only method by which to ascertain an accurate view of the situation.

Any repetitive services to the public will be greeted with flagging interest as the glamor and novelty is eroded. Public response to cyclical mass vaccination campaigns reliably can be expected to decline unless deliberate efforts are taken to avoid this. Assessment becomes increasingly important with each cycle to assure that the needed results are in fact obtained.

SPECIAL CONSIDERATIONS

1. Reorientation to Selective Vaccination

Both the vaccination teams, and the population, must be reoriented to a concept of selective vaccination. In the "attack phase" campaigns everyone was invited to participate. In the maintenance, only a small and selected portion is wanted. Arnold,[2] in discussing pilot projects of mobile smallpox vaccination maintenance activities in Kano State, Nigeria, noted that the concept of maintenance vaccination selectivity "cannot be implanted with the single stroke of the mass campaign technique," but must be developed and reinforced over a relatively long period of time. His experience indicated that both the public and the authorities presumed that maintenance vaccination activities were universal, rather than selective. They objected to attempts of the teams to select by age at the time of vaccination. Such a public response obviously encourages the team members themselves to reject selectivity, creating an unnecessary waste of vaccine and team time. The situation was corrected only

by careful preparation of hierarchical leaders in advance and in turn careful preparation of the public by the leaders. The management of change from universal to selective vaccination is a critical point in the development of maintenance activities; if this change is mismanaged, it may permanently damage any otherwise successful effort.

2. Maintenance Vaccination Demands Active Search for Susceptibles

With a smaller target group, the individual importance of each susceptible increases. Teams must be trained to "lust after" susceptibles and to search for those individuals who do not come forward for vaccination. In The Gambia, N'Dow and Helmholz[3] describe a technique whereby vaccination teams station themselves at the intersection of urban and village streets and roads and send messengers into each compound to look for unvaccinated children and request the mother to bring the child immediately to the team for vaccination. Aggressive techniques of this sort appear necessary to assure high coverage rates.

3. Flagging Interest

This is generally observed to be a characteristic of all repetitive immunization compaigns wherever conducted. The initial enthusiasm gives way to apathy and indifference as a smaller and smaller proportion of the target population turn out for the subsequent cycle. There are no easy answers to avoiding this difficulty. However, its existence must be borne in mind from the outset, and planning undertaken to minimize it insofar as is possible. Imaginative publicity, and long-term education to the necessity for maintenance vaccination, will help. It would appear from past history that diversifying the services offered also is an adjunct to maintaining population response.

4. Combination with Other Preventive Medicine Procedures

In a number of countries, maintenance smallpox vaccination will be combined with the administration of other antigens. These combinations bring with them logistical complications. The necessity for defining different target age groups for different immunization

services is but one of the complexities. Others relate to the questions of logistics, timing of vaccination campaigns, etc. Nonetheless, in many countries, mobile general immunization activities have become standard operating procedure and work effectively. The best example of this approach is the Services des Grandes Endemies, a pattern of operation which characterizes many of the countries in francophone West and Central Africa. Although it has the disadvantage of increased complexity, it has very distinct economic advantages. In addition, it appears that the several services offered tend to alleviate the normal flagging of interest which follows repeated mass single-antigen campaigns. In many francophone African countries, tours of the Services des Grandes Endemies teams, and their predecessors, have been underway for more than 50 years. Yet they continue to attract a substantial participation by the population, largely as a result of the multiple services offered.

5. Increased Per Vaccination Costs

Because of the selectivity in target populations, the operating costs per vaccination administered rise abruptly during the maintenance phase. To carry out a mobile campaign demands transport, personnel, and logistical support, despite the reduction in size of the target group. In actual practice, Foege found in The Gambia[4] that the per vaccination costs rose approximately ten-fold over attack phase operations.

IMPLICATIONS OF SURVEILLIANCE DURING THE MAINTENANCE PHASE

An adequate maintenance program must consist of three items. Two were defined above: (a) immunization of incoming susceptibles, (b) assessment to assure adequate coverage. A third must be added: the detection of suspected smallpox cases via an alert surveillance system, and the rapid control by "fire-fighting" vaccination of any outbreaks. The latter cannot be overemphasized. Dr. D.A. Henderson, Chief, Smallpox Eradication Unit, World Health Organization, has labeled surveillance "the key to smallpox eradication". A maintenance immunization campaign without surveillance cannot be expected to prevent reintroduction to smallpox indefinitely. A surveillance

and epidemic control system should be functioning well as a result of its initiation and development during the "attack phase." The activities of mobile immunization teams can supplement these activities by conducting active case finding at the time of the maintenance immunization visit and by inquiring at each point on their tour for rumors of smallpox in the area.

CONCLUSION

Mobile maintenance smallpox vaccinations is a feasible means of obtaining high vaccination coverage; in some countries it is the only feasible method. These activities are conducted in a manner similar to that of the nationwide mass campaign except that the age of the target group is reduced, and the activity is a permanent recycling rather than a temporary "crash" effort. Mobile maintenance vaccination activities demand a re-education at all levels to facilitate and sustain public response and to assure official and public understanding of the necessity for limitation of the target age group. Assessment must be carried out with each maintenance cycle to assure adequate coverage of the target group. The existence of maintenance smallpox vaccination activities in no way diminishes the need for intense surveillance and outbreak containment procedures.

BIBLIOGRAPHY

1. The Value, Efficacy, and Limitation of Collecting Points in Mass Vaccination Programs. Presented at the Interregional Seminar on Smallpox Eradication, Lagos, Nigeria, May 1969.

2. Measles Maintenance in Kano State, Nigeria. Presented at the Interregional Seminar on Smallpox Eradication, Lagos, Nigeria, May 1969.

3. Maintenance of Measles Control, The Gambia. Presented at the Interregional Seminar on Smallpox Eradication, Lagos, Nigeria, May 1969.

4. Evaluation of Smallpox Eradication/Measles Control Program - The Gambia - June 1968.

5. Handbook for Smallpox Eradication Programmes in Endemic Areas, World Health Organization, July 1967.

6. Report of a WHO Scientific Group on Smallpox Eradication. WId. HIth. Org. Tech. Report Series No. 393, 1968.